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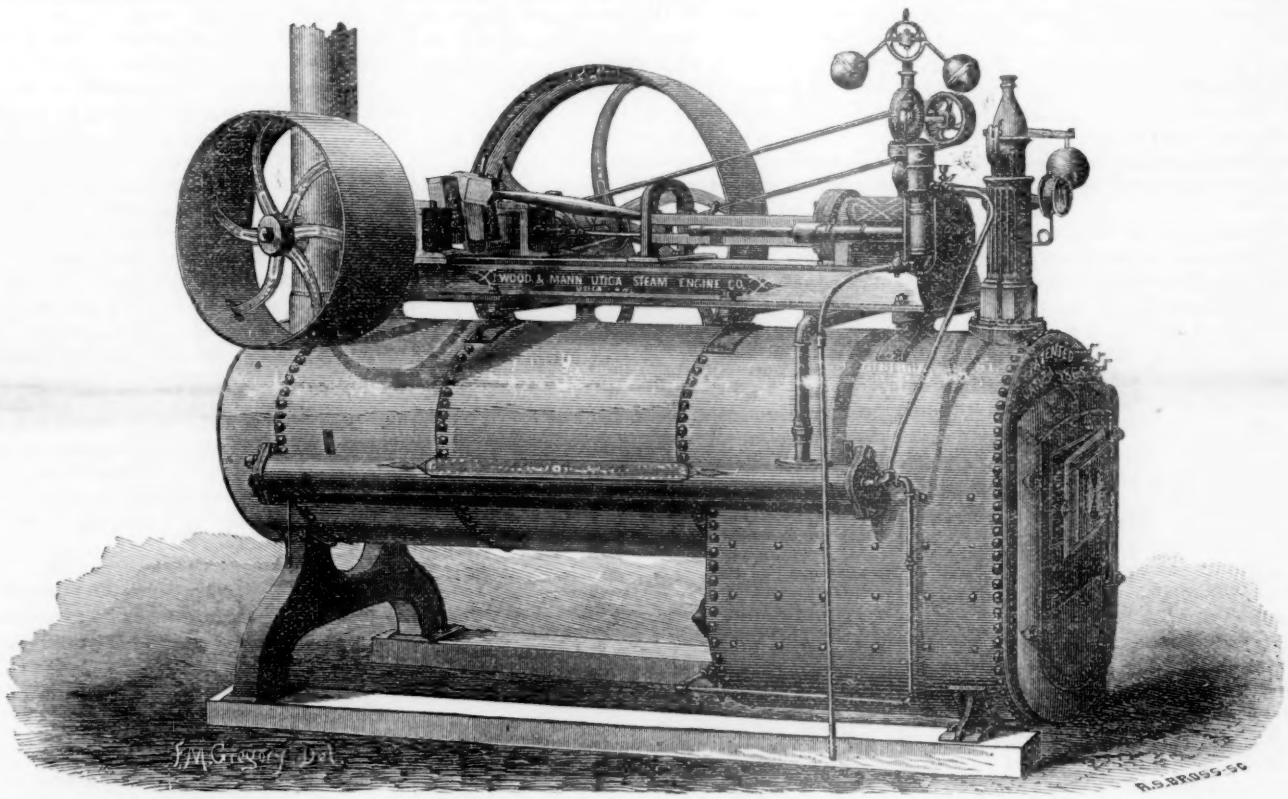

Portable Steam Engine.

The inventors of this engine assert that they were the first to bring the portable steam engine to its present standard, and that they have been enabled to maintain the lean of all other manufacturers in its constant improvement. Also, that not a single improvement has been made upon their engines as they *now* build them; while no alterations of other builders have ever been able to compete successfully with theirs. Their patterns are revised and remodelled to meet every improvement of the age, and they feel entire confidence in offering their engines as by far the most perfect, simple and substantial in the market. That they are easily adapted to any purpose, furnishing the greatest attainable power with the least possible consumption of fuel.

The engine is made with a *bed plate* placed on three or more brackets securely bolted to the boiler directly over its center, and admitting a free circulation of air beneath it. This bed receives all the strain of the engine, entirely relieving the boiler. The entire engine can be readily removed from the boiler and used separately as a stationary engine if desired.

The boiler is built from the best quality of American boiler plate of extra strength. It is made after the locomotive pattern, with the addition of their circular and circulating water bottom. This water bottom, they assert, was first made by them, and the fact that all other manufacturers have made it the subject of frequent imitation is ample proof of its superiority.

The end of the boiler is covered with a cast iron head, having a door through which the flues can be cleaned. This head can be entirely removed if repairs make it necessary. The flues are the best American lap-welded, made to order: they are set in the heads by the most approved patent process, the ends carefully beaded over.

The steam dome on the boiler, already of ample size, has recently been enlarged, giving, as we believe, an amount of steam room unequalled by any portable engine in the country. This dome is attached to the boiler by bolts and nuts, which admits of its easy removal.

The boilers are all furnished with a new and improved gauge cock which can be reground when worn or cut by steam, without removal.

The boilers are all rated to work up to the power claimed, with a pressure of fifty pounds to the square inch, but they will stand a hydrostatic pressure of two hundred pounds.

The boiler is mounted on strong cast iron saddle legs, bolted to skids running the entire length of the boiler, and supporting it during transportation. They may also be used as a permanent foundation, requiring no other setting.

For further information call on, or address G. G. Young, General Agent, 42 Courtlandt street, New York.

Purification of Glycerine Which Has Been Used in Gas Meters.—After stating that at Dresden glycerine is generally used in gas meters, the author gives a detailed account of a process for purifying the glycerine after it has been some four years in the meters, so as to render it fit for use again. The fluid is first heated for twelve hours to from 50° to 60°, and next to from 120° to 130° in order to eliminate water, ammoniacal compounds, and other volatile impurities; the glycerine is next filtered over granulated animal charcoal. Some 300 to 400 cwts. of glycerine are annually purified in this manner at Dresden.—*N. Hasse.*

Chemical Repertory.

No. 78.—October 16, 1872.
EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

485. Marine Photometry.—A correspondent of the New York *Herald*, accompanying Professor Agassiz's expedition on the coast survey steamer *Hassler*, gives a brief but interesting account of an apparatus for determining the relative transparency of the sea at different places, which has already been employed by the expedition at Barbadoes and about the Galapagos Islands. A strip of board, about four inches wide and four feet long, divided into a scale of ten equal intervals, is painted a dark lead color at one end, fading into white at the other. A large white board having been fastened parallel to it, and at a measured distance below it, the whole arrangement is lowered horizontally into the sea. At the dark end, the upper board appears the darker, but at the white end, the lower board, being seen through a greater depth of water, gives the darker appearance, and, of course, at some intermediate division, the two boards appear to be of the same shade. At that division the relative whiteness of the boards is evidently a measure of the percentage of light absorbed while going down and up again through the distance by which the boards are separated. This relative whiteness is readily estimated at night in the cabin by placing the boards at unequal distances from a candle so as to make them of the same apparent shade at the given division of the scale.

The illuminating powers are to each other as the squares of the distances of the boards from the light. Having once ascertained what percentage of light goes through a fathom, the proportion of daylight which reaches any given depth in the sea can be readily calculated. Suppose, for example, that one-half the light penetrates one fathom; then one quarter goes down two fathoms, one eighth, three fathoms, and so on indefinitely.

This apparatus is the invention of Dr. Hill, who regards it as still in a crude form and capable of much improvement.—

486. Asphaltum Paper.—A German inventor of an asphaltum paper for packing purposes, M. Pastor, in the *Deutsche Illustrirte Gewerbe Zeitung*, describes his process as follows:

Any kind of roll paper may be employed, provided it is sufficiently even. A roll of paper containing about 1,500 yards and weighing from 30 to 40 pounds, is fixed to two supports in front of the machine by means of a pole passing through the roll. The end of the paper passes over a cylinder heated by steam, above which a spreading knife is fixed for distributing the melted asphaltum, which is ladled on to a height of about two inches. Cleets are fixed to each side to prevent the mass from running off, so that a margin of asphaltum may be formed. As soon as the paper has passed behind the knife (which must be carefully placed), it is finished and evenly covered and ready for use. The paper is now passed over several rolls until cooled, when it is wound on a last roll. The whole process takes place at a rate of 60 yards per minute. The material used is pure asphaltum from coal-tar; if boiled too hard, a little turpentine is added. The inventor claims that this paper is not only superior to that of ordinary manufacture, but also 30 per cent. cheaper. The price of the machines as sold by the inventor is 200 Prussian dollars.—*Paper Trade Jour.*

487. Roasting Coffee.—There is a considerable difference in the method of roasting the coffee berry in this country and on the Continent. In France, for instance, not only is the machinery used constructed with some amount of care for the purpose of securing the object desired—namely, the equal torrefying of the berries, but the persons employed in the operation have to possess a certain amount of technical skill, and a knowledge of the chemistry of the work they do. In France a roaster has to acquire a knowledge of the various coffee berries, for each different sort requires to be roasted a longer or shorter period than the other; and when it is remembered that, on the authority of those who have studied the subject, a few seconds only will make all the difference in the quality of the coffee, it will be seen that this knowledge is important. Roasters have to serve some years before they are declared thoroughly competent, and the operation of roasting is always under the superintendence, if not of the actual care, of a tried and experienced man. The machinery in use is generally as follows:

A hollow iron ball, turning on its axis, receives the unroasted berries. In it is a valve by which the escape of the gas, arising during the process, is regulated. This ball is turned over a fire and made to revolve somewhat rapidly. Its shape secures the equal contact of every berry with the hot metal. As soon as the berries are sufficiently roasted, the gas is let off, for if it were allowed to remain, the berries would absorb it, and the flavor be vitiated. The revolving motion is then continued until they are turned into the receptacle prepared to receive them. They are then kept in hermetically-closed tins until they are ready for use. In this country the process is much more a rule of thumb affair, and, with rare exceptions, all coffees are roasted alike, in cylinders, which are not capable of roasting so equally as a ball, and but little attention is paid to the chemical effects of the roasting. Another bad feature prevails in England, and that is, the berries are ground by the wholesale dealers, and by the time the decoction reaches the breakfast table the best flavor of the coffee has been floated away in the air. In order to facilitate adulteration, coffee is usually ground very fine, which is another mistake.—*Am. Jour. Pharm.*

488. Stove Ovens.—Mr. R. R. Hastings makes, in the *Prairie Farmer*, the following highly sensible remarks:

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"We talk about hot, quick, and slow ovens, but it takes a very long experience to enable one to tell by the feeling, or in any other practical manner, just how hot an oven is, until we see its effect on the articles cooked, and then it is too late; and it is impossible to communicate to any one else the precise temperature which is represented by our ideas of hot, quick, etc.

"It is a matter of guess-work after all. In fact our whole system of cooking is more or less a patched up system of guess-work. We have rules and recipes for rich cakes and puddings, but bread of all varieties, pies, butter, etc., are made by guess. And even in those recipes which we have, the ingredients are measured in all manner of vessels, and no two persons understand alike the terms which designate the quantities.

"One of our friends has a stove with glass oven doors. Why could not a thermometer also be attached to them?

"I hope to see the time when cooking shall become an exact science; when we shall not only measure the heat of our ovens with thermometers, and know the precise temperature of which they should be for each variety baked therein; but shall also know the temperature at which our yeast and bread-sponge and cream should be kept; when we shall prepare all articles of food by correct recipes, and measure all ingredients in exact and standard measures, which shall be alike all over the country, so that mistakes can only occur when we fail to follow the rules."

489. Freezing of Water.—C. Tellier.—It is generally admitted that water freezes at 0°, and can only be cooled down below its freezing-point by being perfectly tranquil. This holds good for a cold of −10° or −12°, but is, according to the author, not true for temperatures of 3° or −4°; because water may be cooled down to these degrees of temperature, and will not freeze even when the vessel containing it is very violently shaken or stirred. Only a sudden and very violent shock to the vessel will cause the water to become frozen, the temperature rising to 0°; but if, in water cooled down to −3° or −4°, the slightest particle of ice or snow is put, congelation briskly sets in and crystallization ensues, just as in a supersaturated solution of sulphate of soda, Practically, this observation is important, as it proves the necessity of water containing ice, if it is desired to cool it down to 0° precisely.—*Les Mondes.*

[The degrees above are of course Centigrade.]

490. Action of Sulphuric Acid on Wine.—Dr. L. de Martin.—The author has studied the effect of small quantities of sulphuric acid (from 1 to 3 grms. of concentrated acid to the hectolitre=22 gallons) upon the process of the fermentation of the must, the result being (1) more rapid and more complete fermentation; (2) a better and more beautiful color of the wine; (3) analysis did not detect more sulphuric acid in this wine than in samples not so treated, while all the samples had been, as it is termed in Southern France, *platres*, that is to say, treated—cleared—with gypsum. Dr. G. Chancel has repeated these experiments and more thoroughly investigated the process of the fermentation of must, and has found that when the must is alkaline, as it sometimes is, either from some unexplained cause inherent to the juice, or, as is more usually the case, in consequence of much rain, the grapes are spattered and more or less covered with soil, the process of fermentation produces lactic acid instead of alcohol; hence the utility of the sulphuric acid for the purpose of setting up the alcoholic fermentation of sugar.

Dr Chancel found no increase in the quantity of the sulphuric acid contained in wine so treated. Alcoholic fermentation is not possible in an alkaline fluid, the result in such a case being the formation of lactic acid, formed from the sugar.—*Chem. News*

491. The Electric Light.—The Alliance Company at Paris, are now manufacturing improved magneto-electric machines for the electric light. These are now made with four disks, and supply from 230 to 300 carcel jet burners, with a speed of 350 revolutions per minute, and driven by a 2½ horse-power steam engine. The machines certainly seem expensive, costing £320 each; but it is estimated that thereby the combustion of a few pounds of charcoal gives an illuminating effect equal to that of 25 pounds of colza oil. This mode of illumination, therefore, is ultimately inexpensive, especially when applied on the large scale, for ships, large halls, lighthouses, etc., for which it is well adapted; and we shall, no doubt, soon hear of new applications of the invention.—*Scientific American.*

492. Removal of Ink-stains from Colored Woven Tissues.—Dr. Bottger.—The author recommends the use of pyrophosphate of soda for this purpose, the salt to be applied in concentrated solution. The recent ink-stains are readily removed, but older stains require washing and rubbing with the solution for a long time.—*Dingler.*

493. Bread Made with Sea-Water.—Rabuteau, after considering the effects of sea-water in large or small doses on the economy, thinks that bread made with it might be taken with advantage in dyspepsia, phthisis, and scrofula. The bread is extremely pleasant to the taste.—*Am. Jour. Pharm.*

494. Trinidad Pitch for Paving.—From the *Am. Artisan* we get the following information and suggestions:

"New York street officials are subject to intermittent attacks of common sense, one of which is now "on," and repairs calculated to promote the sanitary condition of the city are being made in various districts. On the east side, where cobblestone pavement does most obtain, the stone from the hollows is being taken out, the depressions filled in with sand, and the cobbles relaid. It would be well if some water and gas proof compound were mingled with the sand. Such a material underlying stone or wood pavement would prevent noisome exhalation from the sodden soil below, and conduce much to the public health. In the production of such a compound there is a chance for the profitable display of profitable inventive skill, the coal-tar mixtures having failed to give universal satisfaction. Perhaps the Trinidad

pitch now being used with broken trap for a paving in the City Hall Park would answer this purpose. The pavement in the Park is being laid as follows:

The ground is first compacted by rolling, then coarsely broken stone is laid to a depth of about four inches. Then stone broken more finely, and made hot in an iron box heated by a furnace, is laid five inches deep. The pitch, melted in a suitable tank with sulphur and some other substances to enable it to resist the effects of hot weather, is then poured over the whole. The pavement, which is only a small area put down as an experiment, is then smoothed and compacted by rolling.

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495. Essential Oils—Adulterations.—In a previous item we have explained the ingenious cheat now in vogue, of adulterating flavoring and perfuming oils and essences with a solution of castor oil in alcohol. Dr. Van der Weyde gives us the following useful suggestions:

"Essential oils, especially those of the expensive kind, like ottar of roses, oil of neroli, etc., have sometimes been adulterated with olive oil, or other odorless fatty oils; and then the simple way to detect the fraud is pure alcohol, which will dissolve the essential oil and not the fatty oil, so that the latter will, after repeated shaking, be found to deposit at the bottom, while the solution of the essential oil in the alcohol will float on top. In order now to make this test fail, some enterprising genius, in the adulteration business, hit on the trick to use for this adulteration, in place of a fatty oil, a solution of castor-oil in alcohol; of course this makes the customary alcohol test mentioned above entirely useless, as it all dissolves in any quantity of alcohol.

Therefore in consideration of this new improved fraud a new test is required, and this consists simply in heating the suspected oil in an open dish over a water or sand bath at about 212° Fahr.; then after sufficient time all the essential oil and alcohol will evaporate and leave the thick castor-oil behind, which, by its very nature and appearance, will reveal the fraud.

We need not add that a pure essential oil must nearly all evaporate leaving no remnant, or only a very small amount of incidental impurities, not as volatile as the pure oil itself."

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496. Compressed Air in Mining.—Our manufacturers appear to be quietly pushing the products of their enterprise into remote regions, and mechanism devised by American invention finds its application in many a far-off country. The Delameter Iron-works are building considerable mining machinery for South America, much of it being designated for use on the Orinoco River. This comprises stamp-mills, etc. Air compressors for running drilling and other apparatus below the surface are now attracting much attention, the works referred to having built five of a German model, one of them for the Calumet & Hecla Copper Mining Company of Lake Superior. These compressors are so constructed that, fore-and-aft of the horizontally moving piston, a sufficient body of water is maintained to fill all the passages leading from the cylinder, at the end of each stroke. By this means no air is left in the cylinder or its ports to expand again during the reverse movement of the piston. The water also serves to absorb the heat evolved by the compression of the air, and which without some means of removal would heat the machinery and impair if not destroy its efficient operation. This matter of air-compressing promises to be one of very great importance, for some of the best mines in this as in other countries are becoming so deep that the temperature is intolerable, and the exhaust from an engine worked by compressed air, from the heat rendered latent by the expansion of the exhaust air, will materially remedy the difficulty.

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497. Nervous Debility—Celery.—The following item has been going the rounds of the medical Journals. If authentic, it is valuable:

"I have known many men, and women too, who, from various causes, had become so much affected with nervousness that when they stretched out their hands they shook like aspen leaves on windy days; and by a daily moderate use of the blanched foot stalks of the celery leaves as a salad, they became as strong and steady in limbs as other people. I have known others so very nervous that the least annoyance put them in a state of agitation, and they were in almost constant perplexity and fear, who were effectually cured by a daily moderate use of blanched celery as a salad at meal times. I have known others cured by using celery for palpitation of the heart."

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498. Diamond Drills.—We get from a White Pine, Nevada, paper (through the *Lond. Mining Jour.*) the following information:

"One of these drills has been placed in the Satterthwaite tunnel, or lower level of the South Aurora Mine, under the direction of Dr. Goodfellow, and commenced boring on Monday. He proposes to prospect this mine downward and at various inclinations eastward, to distances varying from 500 to 1,000 feet. The drill is a diamond cutter, as its name indicates. The diamonds are rough, dull-appearing stones, about half an inch in the longest diameter, and firmly set in the bottom of a hollow iron mandrel. There are four of these stones, two of which project slightly beyond the outer circumference, and two inward towards the center of the mandrel. The motion of the drill is rotary, and as the diamonds cut downward a cylinder or core of rock is left in the mandrel or boring bar. This is broken off at convenient distances, and brought to the surface for inspection. The hole cut in the rock is 3 in. in diameter, and the core inside the drill is 1 in. The sand produced by the cutting diamonds is washed to the surface by a stream of water that is constantly descending through the hollow boring rods, and ascending outside of these rods from the bottom to the surface. An upright tubular boiler, with an oscillating cylinder engine of about 5-horse, furnishes the power. To this is attached a pump, and a screw so arranged as to govern the pressure on the cutting-bar. Through the limestone of this country, and at moderate depths, 30 feet per day is a low estimate. It is the opinion of geologists and engineers who are well acquainted with this locality that Dr. Goodfellow, reaching out in this way, must certainly disclose the mineral wealth of Treasure Hill that lies far down, and of which we have been working only the froth and foam of the heavier treasure that lies below. In his explorations this community is much interested, and in his success we anticipate a future of industrious prosperity."

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499. Genius.—A newspaper correspondent, in reference to the recent death of Auber, the illustrious composer of Fra Diavolo, Masaniello, and other deathless creations of genius, cites the opinion of M. Jules Simon, that Auber was an indolent man, who performed his work without labor, whose great works *produced themselves*, so to speak, without an effort on his part. This illustrates a popular error, than which none is more rife. Genius, whatever that indefinable thing may be, doubtless exists, but without labor, the man of genius would never be aught but a "mute inglorious Milton." An English virtuoso once begged from Horace Vernet a sample of his art for his album. The painter dashed off in a few seconds a splendid horse. The lion-hunter politely urged that something requiring more time and labor would please him more. "You are in error" said Vernet, "in that respect I have spent *twenty-five years* in making that horse." The correspondent we quote asserts that Auber always rose at five, and had his days work done probably before M. Jules Simon had begun to gape and rub his eyes.

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500. Thermometrical Experiments.—The Providence *Journal* describes the following interesting experiments made in that city with an excellent glass mounted thermometer, F.

In the house, with open windows, it stood at 90 2°. Out of doors in the shade, at 95°; freely suspended in the sun, six feet above the greensward, 99 5°. In the same position, with wet bulb, 79·9°; with bulb covered with black silk, 109·96°. When laid upon the grass in the sun, it rose to 104°. Laid upon white cloth, placed upon the grass, 105·0°, and when similarly placed upon black silk, it indicated 113°.

The experiments with different colored coverings show conclusively the utility of light colored clothing for those who are obliged to be exposed to the direct range of the sun at high temperatures; and the experiment with the wet bulb shows as clearly the value of free perspiration in keeping down the temperature of the body, which, however, the observer, in his own person, notwithstanding the perspiration while making these experiments, to have risen to 100·5°, about two degrees above the usual standard for cooler days. The average temperature of the healthy human body throughout the year, in temperate climates, is98·4°; while in tropical regions it is about one degree higher.

"Gas-Machines."

The following exhaustive remarks on this and related subjects, are extracted from a paper read last March, to the Franklin Institute, by Dr. William H. Wahl, who succeeded Prof. Henry Morton in the Secretaryship of that Society, and the editorship of the *Journal of the Franklin Institute:*

"Now that the properties of the light petroleum oils have been presented, and the sources of danger attendant upon their use clearly indicated, it behooves us to consider the question as to whether these dangers can be met and obviated; in other words, to determine whether or not these valuable light-giving agents shall be altogether discarded for the purposes of household illumination, or whether any plans have been devised by which they can be utilized with a reasonable amount of security.

"The defects of these products for use in the household lamp are precisely the difficulties which must be obviated. These consist, as has already been shown, of the difficulty of certainly confining the inflammable vapors, owing to the friable nature of the glass of which the body of these lamps are universally constructed, and the looseness of the joints; and again, the objection arising from the danger of careless refilling, where so many accidents occur. In many of the hundred odd gas-machines which have been built within the last few years, these two objections have been obviated with more or less success—in some of them completely.

"The first of these objections can be avoided by making the reservoir a fixture; a strong metallic box, the contents of which shall be hermetically sealed from contact with the air while being used; and, by locating this at some convenient distance from the dwelling, either above, or, better still, under ground.

"The second objection, namely, the liability to accident in refilling, requires simply the obvious precautions that the operation shall be conducted in daylight, that the reservoir shall be large enough to contain a supply for several months, and that pipes or tubes and stop-cocks shall be called into requisition during the operation of filling.

"With slight variation in detail, most of the automatic gas machines adopt these precautions, and, as a class, we have little hesitation in pronouncing them as safe as ordinary illuminants.

"On the score of convenience, much depends upon the construction of the machine, the number of details of its operation, which require personal attention and which are automatic, and the complication or simplicity of its parts.

"It need scarcely be said that, where ordinary coal-gas is at hand, these machines are unnecessary, most persons preferring the convenience of the former, without taking the question of economy into account. In places, however, where this is not to be had, and this happens to be the rule, these machines, with the above-named qualification, afford an admirable substitute for gas: for the advantsge of enjoying in locali

ties remote from cities the luxury of a light fully equal to the average of that afforded by coal-gas, more than repays the routine of attention which they demand. With an apparatus not cumbersome or complex, of which there are several to be obtained, the labor and attention to be bestowed upon it is but trifling.

"On the score of economy, we believe that, with the exception of a few devices, employing certain gases (hydrogen, for instance), to take up the gasoline vapor, no person has raised a question; it being, so far as our knowledge extends, generally conceded, and correctly so, that in the simple forms of automatic machines, which simply carburet the air, the price of the illuminating product is less than that usually charged for coal-gas.

"Having thus given the gas-machine a general consideration, it will be advantageous to review briefly the different plans adopted by inventors in their construction; and while striving justly to avoid the imputation of invidious criticism upon anybody's machine, to point out the system which seems to meet the case most effectually and economically.

"In a former portion of this review, it was stated that all the numerous plans for utilizing gasoline, were readily susceptible of classification into two groups.

"In one of them a regulated current of hydrogen gas is generated in a suitable apparatus, by the action of sulphuric acid upon iron scrap; and the gas thus evolved is passed through the oil, or porous material moistened with it, and contained in a separate receptacle. The gas is in this manner charged mechanically with as much of the vapor of the oil as it can carry, and in this condition comes to the burner to be utilized. The light emitted is generally as good as, or even somewhat superior to, the best coal-gas.

"The process, however, is open to several and very serious objections; it is costly, and is altogether too complex in its operation and in the parts of the machine to warrant more than a limited introduction.

"This form of machine is unsatisfactory on the score of economy, though the beauty of the light obtained will go partly towards the amelioration of the grave item of expense, and perhaps the sale of the refuse matter in the generating vessel to the manufacturing chemist, for the extraction of the green vitriol, may affect a slight reduction.

"The objection on the score of inconvenience resides in the introduction of details requiring frequent personal attention, and the incidental liability to become disordered if neglected. The reference here is to the generator, which must frequently be replenished: an operation which, from the nature of the acid and of the refuse, is a disagreeable one.

"It is certainly to be regretted that a process which affords so excellent a light should be attended with objectionable features which seem to be unavoidable.

"In the other group may be classed those machines in which the air is passed through the oil or porous material saturated with it, and the illuminating gas so formed utilized.

"In some forms, heat is called to assist the volatilization of the oil. In others, of simpler construction, the application of heat to the oil is omitted, and the air is simply passed through the reservoir at the ordinary temperature, though the volatilization is often aided by keeping the oil in constant agitation by various devices.

"With the hydrogen as well as with the air-blowing machines there is considerable difficulty in securing a gas of uniform quality, owing to the fact that the very process of volatilization is one in which heat is absorbed or rendered latent; so that several hours after a machine has been in operation, the oil within will be found to be sensibly colder than when started. The consequence of this difficulty is that the light will gradually lose in brilliancy, owing to the gradually diminishing amount of the oil vapor it carries with it. The earlier gas-machines were from this cause nearly all worthless, and have either long since been abandoned or considerably modified to meet the objection.

"In several existing forms of the air-blowing machine this difficulty has been so far obviated as to become of practically little consideration. The plan adopted in these is to keep the blower separate from the reservoir of oil, so as to operate upon very small quantities at a time; the constant influx of fresh oil from the tank thus preventing any serious diminution of the temperature during the operation. The supply is taken from the bottom of the reservoir and is automatically admitted in the necessary quantities by a ball and cock or other mechanical device. In addition to this the stationing of the tank under ground is likewise of itself a tolerably efficient means of keeping the temperature of the oil nearly constant at all seasons of the year.

"There are some important details necessary for the proper operation of these machines, which it may be well to briefly mention.

"It is evident the more thoroughly the oil is agitated and the longer it is kept in contact with the entering air,) the greater will be the quantity of oil evaporated and the richer the gas. Hence, other things being equal, that machine which most effectually meets this requirement is the best. In the best machine of this class which we have seen, this was accomplished most effectually by a fan furnished with tilting buckets upon its edges, which, while it induced a current of air, at the same time keeps the oil in constant agitation. The fan strikes the oil in its revolution, the buckets lift the oil to the top of the box, and tilt it over a part tion down a series of slightly inclined planes (supplied with bits of sponge) one beneath the other, by which it is obliged to traverse many times the length of the box before again reaching the well from which the buckets had removed it. The air on the other hand is made to travel over precisely the same course, but in an opposite direction; emerging at the top of the box, saturated and in condition to be supplied to the burners.

"In certain machines, as before remarked, it is ought to aid the volatilization by heat, the air being blown into a vessel of oil, heated beneath by a flame; but, however effectual this process may be in maintaining regularity in the quality of the gas, it will never become a popular favorite, owing to the grave objection of the use of fire, by which the possibility of accident is greatly increased.

"Taking all things into account, it would seem, then, that the simple air-blowing machine, which does not involve the application of external heat, and which is constructed with reference to the simple conditivns of safety and convenience which have been set forth in detail in several of the preceding pages, meets the requirements of practice better than any other, and should therefore be preferred by those desiring to introduce the gas-machine in one of its many forms.

"In conclusion, it may be remarked that the introduction of gas-machines has greatly extended of late years, and, owing to the cheapness of the light petroleum oils, and the numerous improvements which have been made in construction, this increase bids fair to be still greater in the future. The whole subject is one of great practical interest, and it may safely be said that it has not received from the public that attention which its importance demands.

"The reasons for this lack of interest and, in many cases, of positive opposition, have already been pointed out, and it is believed that if the presentation of the case here made is carefully considered, the result might be to clear away some points upon which popular misapprehension is very general, and to bring about a more just estimation of a subject which will doubtless become, at no very distant period, one of great industrial importance."

Decomposing Action of Humus Upon Minerals.

Every one who has studied the growth of plants must have come to the conclusion that it is necessary to look beyond the gases of the air and the carbonic acid water of the ground to account for the power of vegetables to decompose many mineral substances. It is evident that some other acids come into play and exert a decisive influence. Herr Senft, of Eisenach, Germany, has submitted the question to a long series of investigations, and the conclusions to which he arrives are well worthy the attention of scientific men. The researches of Mr. Senft go far to confirm the shrewd theory advanced by Prof. Henry Wurtz, of New York. that the organic acids have played a much more important part in the formation of rocks and minerals than geologists have been in the habit of conceding. It is evident that plants, while living, are able by the products of their growth to act upon insoluble minerals and appropriate certain constituents to their wants, and that, when the plant is dead, it can, during the process of decay, produce acids that either dissolve minerals or render them soluble. The conclusions to which Mr. Senft arrives are as follows:

1. When the plant decays with exclusion of the air, it is capable of reducing metallic oxides to metals, or to oxides, with which the organic acid, called geic acid, can combine.

2. When the decomposition takes place with access of air, humic acid is produced, which can unite with the bases to form a series of salts, which are partly soluble and partly insoluble.

3. The soluble humic acid salts, especially of the alkalies, have a powerful action upon the mineral salts, and convert them into humates, which in turn are decomposed into carbonates.

4. The carbonates, phosphates, arsenates, sulphates, the chlorides and the zeolite silicates are decomposed by the humic acid salts.

5. The humus acids are themselves constantly changing, so that their action upon minerals is variable. This instability of the organic acids has rendered the investigation of their action upon mineral substances very difficult, and appears to have deterred chemists from pursuing the subject. The products of the decay of woody fiber, called geic acid, humic acid, ulmic acid, crenic and apocrenic acids, are really very little understood. When we pursue the subject in the path indicated by Prof. Wurtz, we may some day discover that the quartz, diamond, and ruby were held in solution by organic acids, and that metalliferous deposits were reduced by the same acids without the intervention of fire or of galvanic currents.

The whole question offers a fine field of research to the chemical geologist.—*Prof. Joy, in Jour. Applied Chemistry.*

Coal on the Pacific Coast.

The production of coal in California is being prosecuted with vigor. The product of the Mount Diablo mines for the past six months, shows a marked increase over the same time last year, as will be seen from the following statement:

	1871.	1872.
January, tons	9,332	14,671
February	8,832	13,616
March	10,508	16,030
April	9,157	13,062
May	11,468	14,778
June	11,177	12,289
Totals	60,474	84,446

At least 90 per cent. of the product at these mines finds its way to the city, where it is chiefly used for steam purposes. These mines are the only ones worked in the State to any extent. Our other Pacific coast supplies come from Oregon, Washington Territory, Utah and British Columbia. The mines in Oregon and Washington Territory from which we obtain supplies are at Coose Bay, Bellingham Bay and Seattle. The receipts from these sources for the six months compare as follows:

	1871.	1872.
January, tons	3,994	2,790
February	4,367	1,404
March	2,010	3,455
April	6,013	3,877
May	4,768	4,497
June	4,371	4,387
Totals	27,423	20,410

The decrease of receipts from these mines is easily explained. There was a stoppage of several weeks at the Seattle mine to complete railroad to the water. There have been no receipts from the Bellingham Bay mine, on account of a fire in the early months of the year, and the repairs subsequently needed. A vessel was recently sent there to load, and it is reported that the mine is now all right. Most of the receipts of coast descriptions for the past six months have therefore come from the Coos Bay mines. Hereafter it is expected that the Bellingham Bay and Seattle mines will furnish their usual supplies. The Rocky Mountain mine in Utah has sent us 771 tons coal in the past six months all by railroad. Our imports from British Columbia compare as follows:

	1871.	1872.
January, tons	1,975	420
February	2,227	...
March	...	4,380
April	1,028	2,280
May	1,000	7,060
June	1,466	2,500
Totals	7,796	16,640

The comparison shows an increase of 9,000 tons from that source. Recently a cargo arrived from the Wellington mine, a new claim in British Columbia. Our coal imports from Australia compare as follows:

	1871.	1872.
January	...	4,329
February	4,357	8,890
March	...	11,640
April	840	9,930
May	4,193	7,982
June	1,554	3,386
Totals	10,944	46,157

Our other foreign coal imports for the past six months embrace 5,831 tons English and Scotch, and 3,862 tons Chili, against 2,201 tons English for the same time last year. Our receipts from domestic Atlantic ports for the six months consist of 4,483 tons and 1,193 casks, against 5,452 tons and 2,224 casks for the same time last year. Recapitulating, we have the following receipts of coal at San Francisco for the first six months of the year:

	1871.	1872.
Pacific coast supplies, tons	81,850	97,183
Eastern supplies.....	7,232	5,547
Total domestic.....	89,082	102,730
Total foreign.....	20,941	72,490
Grand total.....	110,023	175,220

While the Pacific coast supplies are steadily increasing, there is reason to believe that there is more than the usual quantity afloat for this port. The twenty-five or thirty vessels on the way here from Australia must have about 50,000 tons, to say nothing of the quantities on the way from Europe, South America and the domestic Atlantic States.—*San Francisco Bulletin.*

Glycerine.

By Prof. Charles A. Joy.

[Condensed by the Editor of this Journal.]

[From one of Prof. Joy's interesting and valuable papers on subjects in Applied Chemistry, we make such extracts as we think especially interesting to our readers. The whole will be found in the August and September numbers of the *Journal of Applied Chemistry*. We must be allowed some surprise that the learned author has preferred the Germanized terminology in the word glycerin, which belongs to a kind of scientific neologism, which we regard with horror. We had hoped and thought moreover, that Prof. Joy was with us in withstanding this modern foppery in chemical nomenclature.—Ed.]

The manufacture of glycerin is now conducted on a large scale, and the methods have undergone numerous modifications of late years. For pharmaceutical purposes it is sometimes prepared according to the original recipe of Scheele. Lead plaster is made by boiling together litharge, olive oil, and water. The oil is decomposed by the lead taking its acid, and the glycerin is thus liberated. In the treatment of oils and fats with caustic alkali, the fatty compound is decomposed, forming an alkaline stearate called soap, and liberating the glycerin which remains in solution when the soap is separated by throwing in common salt. Instead of separating the soap by means of common salt, Rabbit proposes the substitution of caustic soda, and to boil the lye containing the glycerin with a fresh portion of tallow, by which the alkali will be absorbed, and the glycerin will be isolated and diluted with water. By using vacuum pans and a pressure of only 50 millimeters, the glycerin can be distilled at a temperature of 210° C. after the removal of the water. The fats are usually decomposed with high pressure steam, free stearic acid and glycerin being produced. Other methods are the employment of hot water without the production of steam, also sulphuric acid and metallic chlorides. The glycerin which is produced in the manufacture of rum, brandy, wine and alcohol is now attracting considerable notice as being an incidental product worthy of consideration; the amount of succinic acid resulting from the same processes is so small that it can hardly be separated with economy. It was shown by Perkins as early as 1822, that in a steam engine which worked under very great heat and pressure, and in which the condensed steam continually returned to the boiler, the fats and oils, used for lubricating, became, by the combined action of water, heat and pressure, decomposed into other substances, which, after analysis, were pronounced by Faraday to be identical with the fatty acids and glycerin. Although this was published at the time, the hint was not acted upon until thirty years afterward, when superheated steam was introduced in Germany to decompose fats into glycerin and the acids.

* * * * * *

The specific gravity of pure anhydrous glycerin is 1.261, and the following table will show the strength of aqueous solutions of glycerin determined as 17.5 deg. C.:

Sp. gr.	Per cent. Anhyd. Gly.	Sp. gr.	Per cent. Anhyd. Gly.
1.261	100	1.125	50
1.240	94	1.117	45
1.232	90	1.099	40
1.206	80	1.073	30
1.179	70	1.048	20
1.153	60	1.024	10

The freezing point of glycerin is stated differently by various authors. It is said by some to solidify if exposed to a very low temperature, furnishing a mass resembling loaf sugar in appearance; it does not liquefy till heated a little above 32° F. As long as any crystals remain it freezes again by a slight depression of temperature, but when once liquefied it may be cooled to —4° F. (—20° C.) without freezing. When mixed with water the degree of crystallization is at once raised. Bullock found that:

1 gallon water and ½ pint glycerin freezes at 30° F.
1 gallon water and 1 pint glycerin freezes at 24° F.
1 gallon water and 1½ pints glycerin freezes at 18° F.
1 gallon water and 2 pints glycerin freezes at 10° F.
1 gallon water and 3 pints glycerin freezes at 3° F.

Glycerin is slightly volatile at 212° F., but, if distilled alone at the ordinary pressure of the atmosphere, the greater part of it experiences decomposition, with disengagement of intensely pungent vapors of acroleine, which excites a most painful irritation of the eyes. When heated sufficiently in the air it burns with a luminous flame. In a close still, when the pressure is reduced by a pump to 12.5 mm., chiefly water goes over; under a pressure of 50 mm., glycerin distills over unchanged at 210° C. Glycerin may also be distilled without alteration in a current of superheated steam which has been raised to a temperature of between 500° and 600° F.; advantage is taken of this fact in order to prepare glycerin in large quantities. According to Bolas, when glycerin has been rendered anhydrous by distillation, it absorbs moisture with avidity from the atmosphere to the extent of 50 per cent.

It is a permanent liquid, undergoing very little change in the air, not turning sour or moulding or evaporating, but retaining a moist condition and sweet taste, unless acted upon by chemical agents.

The solvent properties of glycerin are such as to suggest its use in many ways. It dissolves most of the deliquescent salts, as well as many other substances, which are soluble in water. It extracts the active principle from plants and vegetables, and it takes up perfume from flowers.

* * * * * *

The following substances are said to be insoluble in glycerin: Ether, benzole, camphor, carbon disulphide, chloroform, the bromide and iodide of mercury, calomel, fatty acids, fatty and etherial oils.

Pure glycerin is neutral to test paper, and leaves only a slight residue when evaporated in a porcelain capsule. When mixed with an equal volume of vitriol it is not browned, even after the lapse of several hours. A solution of oxalate of ammonia does not even produce a cloudiness when mixed with pure glycerin. Nitrate of silver yields no precipitate, and this reaction is so delicate that photographers employ it to test the purity of their silver solution; an impure nitrate yields a precipitate with pure glycerin, and hence the glycerin, when known to be pure, serves as a good test.

Pure glycerin is as clear as water, and has no greasy feeling when rubbed in the palm of the hand. The adulteration of glycerin by dextrine and glucose is detected by the well-known copper test for grape sugar.

* * * * * *

Four parts by weight of yelk of egg rubbed in a mortar with five parts of glycerin gives a preparation of great value as an unguent for application to broken surfaces of the skin. It has a honey-like consistency, is unctuous, like fatty substances, but has the advantage over them of being easily removed by water. It is also unalterable. Applied to the skin it forms a varnish, which effectually excludes the air and prevents its irritating effects. These properties render it serviceable for erysipelas and cutaneous diseases, of which it allays the action.

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Glycerin vaccine lymph is highly prized on account of its stable character. For its preparation the pustules of a healthy vaccinated person are opened with a needle and the effluent matter carefully removed by means of a lancet. It is put into a suitable vessel and mixed with twice its quantity of chemically pure glycerin and as much distilled water. The liquids must be thoroughly incorporated by means of a paint brush, and for preservation can be put into capillary tubes.

A glycerine ointment of much repute for chapped hands and excoriations is made as follows: One-half ounce of spermaceti is melted together with a drachm of white wax and two fluid ounces of oil of almonds, by a moderate heat; the mixture is poured into a Wedgewood mortar, when a fluid ounce of glycerin is added to it and rubbed till the ingredients are thoroughly mixed and cold.

The introduction of glycerin in small quantity in pills prevents induration and decomposition. Where resin is present it is well to add a small quantity of alcohol. In general the substitution of glycerin for syrups when prescribing medicine in liquid form is highly recommended by physicians.

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The employment of glycerin in wet gas meters appears to have been first suggested by Prof. Henry Wurtz, who experimented on the subject in the laboratory of Dr. John Torrey, in 1852, and subsequently read a paper at the meeting of the American Association for the Advancement of Science, at Baltimore, in April, 1858. In this paper Prof. Wurtz says:

"I propose as a substitute for both water and alcohol for oiling gas meters, *glycerine*, sufficiently diluted to prevent its absorption of more water from the gas, and increasing in volume to any important extent, rendering the meter independent of attention within the ordinary limits of temperature."

The cost of the material prevented an early application of Prof. Wurtz's suggestion, and it was not until the lapse of nearly ten years that glycerin came into common use for filling wet meters. As Prof. Wurtz did not take out a patent for his valuable discovery, he has not reaped the pecuniary reward that ought to attend upon such important contributions to our wants.

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Glycerin soaps were among the earliest adaptations of the healing properties of a substance that, in the regular manufacture of soap, had been previously thrown away. As glycerin does not combine with the alkalies in the same manner as the fatty acids, it has been customary to separate the fat by salt water, and what are called glycerin soaps, in fact, contain very little of that article. There are ways, however, of introducing this important ingredient into soap, which ought to be more generally understood. Professor Heeren, of Hanover, Germany, recommends the following process: 100 parts, by weight, of oleic acid are introduced into a flask, and 3.14 parts of glycerin, specific gravity 1.12, are added, and the mixture heated to 50° C., when 56 parts of a solution of potash, of density of 1.34, is gradually incorporated, and after the whole has became homogeneous, the soap, in a liquid form, is allowed to cool, and on some occasions is diluted with water, in order to purify it by filtration. By evaporation it can be made to assume the consistency of honey, and at this stage any desired perfume can be introduced. This is a genuine glycerin soap, capable of many useful applications. It is best kept in a wide-mouthed vessel in which is a glass or porcelain spoon, for dipping out the small quantity required.

The property of glycerin to extract the odoriferous principles of flowers is now used to advantage. The leaves of roses, of hyacinth, jasmine, geranium, etc., are to be put into a stoppered bottle, and glycerin left in contact with them for three or four weeks. All of the perfume will be extracted, and the glycerin will mix readily with water, a scented wash can be prepared for the hands, as well as extracts made for use

in the manufacture of perfumery. If the glycerin be left in contact with red pepper balls, it will extract a principle very strengthening to the hair, and less dangerous than the preparation of cantharides now often used.

The demonstration by Pasteur, and later by Nessler, Pohl, Wagner, and others, of the natural presence of glycerin in fermented liquors, gave rise to a new process for the improvement of wines called Scheelizing, from Scheele, the discoverer of glycerin. * * There is at present an enormous consumptien of glycerin in the improvement of wines made from inferior grapes, the juice of which, being deficient in sugar, can never yield a sweet wine. It is preferable to sugar for the purpose, as, although sugar is cheaper, it would produce a second fermentation, which is not wanted. It is hardly necessary for the wine merchant to conceal this application, as it is perfectly notorious that all wines are more or less manufactured articles, and, as long as adulterations are not practiced, the amelioration of the sour grape juice by a perfectly pure and innoxious compound cannot be just cause for complaint. The price of artificial and Scheelized wines and champagnes, ought, however, to undergo a very material reduction.

British Association of Gas Managers, June, 1872.

Mr. G. Livesey read a paper upon

THE HYDRAULIC MAIN.

The title of my paper is rather wide and indefinite, but as the interest by general acknowledgement attaches more to the discussion than the paper, and the subject being one on which so much can be said, I think in so wording the title that members cannot well be out of order in speaking on it. I shall make an opening for remarks that may be very valuable, though I intend confining myself strictly to a description of a difficulty and to a means of successfully preventing its occurrence.

The old-fashioned D-shaped main, with a bridge at every length to keep the seal at the proper level, in in the event of any alteration of level in the whole length of main, seems to have been specially contrived to retain the thick tar and convert it into pitch, to be removed once a year or oftener by taking off the covers and digging it out after having with great labor broken it up with clinkering spuds and chisel bars.

The substance thus removed consisted of a mixture of pitch or very thick tar, and crystals of muriate of ammonia conglomerated into a very solid mass, and which filled the main nearly to the water level, with a small basin or cup as it were under each dip-pipe, just allowing the gas to pass—this cup being in fact formed by the passage of the gas, but instead of having a free passage the resistance in time became so great as to produce a tendency to frequent stoppage of the dip-pipes.

Various means have been tried to prevent or clear out this accumulation of thick tar, one being an enlargement of the hydraulic itself till, in one case that I have seen, each length would make a small Cornish boiler; then the elevation of the hydraulic from two to four or five feet above the brickwork with the object of removing it beyond the reach of heat—it being considered that the heat from the setting converted the tar into pitch. A stream of gas liquor has in some cases been caused to flow through the main and for a long time I had a quantity of hot water from the steam-boiler put into the main once or twice a week; but this did very little permanent good. The making the main deeper and square at the bottom has been suggested, means for drawing off the tar from the bottom instead of the top have been devised and used with varying success, but by no plan so far as I am aware, has the prevention of this accumulation been certainly and completely attained.

The causes of its production are twofold: first, the retention of the tar in the main; and second, the heat of the gas from the retort in passing through this comparatively stationary tar evaporating its volatile constituents; for *it is the hot gas and not the radiated heat from the setting that does the mischief.*

If, therefore, one of these causes could be removed, a good result would be obtained by reducing the temperature of the gas before it reaches the main (this has been done by Mr. Morton, of the London Company, by lengthening the ascension-pipes), or carrying away the tar immediately it is deposited, or by keeping it in motion, and not letting it be a sufficient time in contact with the hot gas to volatilize its lighter constituents. On thinking over this matter I asked myself—What is the use of that large space below the bottom of the dip-pipes? It is certainly not required to allow the gas to pass, for the gas does not extend 2 inches, if an inch, below the edge of the dip-pipe; consequently, the heavy tar sinking to the bottom is never disturbed. It then occured to me to put a false bottom in two of the mains at the South Metropolitan works; this was done by means of a plate of 10-gauge sheet-iron, dished to the extent of 2 inches, placed so that in the centre it was just 2 inches below the bottom of the dip; the area of the main above the bottom of the dip was therefore not reduced; the space below the false bottom was filled up with sand. I considered that the false or shallow bottom, having a smooth surface, the tar would not be so likely to adhere; seeing that the bubbling through of the gas would always keep the centre disturbed, and thus produce a circulation from the centre to the sides. The result exceeded my expectations, for after a winter's working I had the cover taken off the hydraulic in several places when the whole of the beds had been some time out of use, and the tar had had a chance of becoming cold and stiff; I found it in a perfectly fluid state.

The next summer I had nearly the whole of the hydraulic mains fitted in this way; in one division of the retort-house a new main, of the section shown, was put up in place of the old sort, and but one length of main, having a 2-inch perforated pipe laid along the bottom, through which water from the steam-boiler could be sent, was left without alteration. I had therefore last winter an opportunity of thoroughly testing the plan, and with again the same result, the tar perfectly fluid, no pitch or thick tar, and no crystals or ammonia, and better still in the whole of the mains with the shallow bottoms I might almost say *there was not a stopped dip-pipe all the winter;* and *stopped ascension-pipes were of much more rare occurrence;* in fact, though I often made the inquiry of the foreman and other men, I always got the reply that *they had no trouble with them.* In the length of main fitted with the *water-pipes* the dips *stopped as usual.*

The form of main—see section—I now use is much lighter, because smaller than those used formerly, though the area for water is the same; there is, therefore, a *saving in first cost. Another considerable saving* results from the gas passing the seal with much greater freedom, the *cost of cleaning* dip-pipes is saved, and consequently the retorts work constantly, and the very dirty and expensive job of cleaning out the main periodically is avoided. I think the thing was worth a patent, but had I protected it, I should not have appeared before you to describe my invention. It is, after all, a small matter; but if it be an improvement, and one that will relieve gas managers to some extent of their anxieties or annoyances—and they have their shares of these now-a-days—they are very welcome to its use; and if the idea is really new, and not, as is quite possible, been tried before, let me ask of you to speak of it as the "Livesey Hydraulic."

Mr Barratt—Accrington—asked what was the height of the hydraulic from the top of the bed.

Mr. Livesey said, 18 inches.

Mr. Barratt wished also to know the height of each pipe from the top of the retort.

Mr. Livesey said, about ten feet. The dip-pipe extended two feet above the top of the hydraulic.

Mr. Ohren asked whether Mr. Livesey found two inches dip in the hydraulic was sufficient, and whether, if he had made the dip-pipe longer and brought it nearer to the bottom, he would not have had an advantage by obtaining a greater gas-way from the main?

Mr. Anderson said he did not gather from Ma. Livesey what was the chief object in making the alteration, unless it was the saving of the necessity for cleaning out the hydraulic main and the avoidance of stopped pipes. But for himself, he did not know that it was a necessary condition of making gas that they should clean out the hydraulic, or that they should have stopped pipes. The cause of the latter was that the heats employed were too great, so that the naphtha, which had been in the gas was converted into pitch in traversing the pipe. It did not matter how large the pipes were, for if the heats were very great, a stoppage must be the result. He had tried pipes of 8 inches diameter, and all the difference was that they did not stop up so quickly as those of 4 and 5 inches diameter. With reference to the suggestion of Mr. Livesey, there was one advantage in it, that it was more economical. But he thought that with the dip-pipe so near the bottom of the main there would not be so free a flow for the gas. By the mode suggested the tar would be caused to flow away faster, and would not be allowed to accumulate.

Mr. Miles—Deane—thought Mr. Livesey was recommending them to do something they were advised last year not to do. At the meeting in Dublin, Mr. Somerville recommended managers to have square, or rather, rectangular hydraulics, and that recommendation was received with great favor. Another thing they had been taught was to have as much room in their apparatus as possible. But according to Mr. Livesey's suggestion they would be contracting it. Why not go back to the 15-inch circular hydraulic? Or why should not Mr. Livesey carry his dip-pipe 4 or 5 inches lower instead of making his hydraulic shallower? He—Mr. Miles—could not see the advantage to arise from the alteration in any way.

Mr. Irons—Gosport—said the subject of the hydraulic main was a very important one, and he should like to ask a question of Mr. Livesey. In his paper Mr. Livesey alluded to the stoppage of the dip-pipes, but said nothing about the ascension-pipes. Now he—Mr. Irons—quite agreed with Mr. Anderson that the stoppage of the latter arose from the heat from the retort. If a manager had leaky retorts and was using an exhauster, he would find that these were the pipes to stop soonest. What he wanted to ask Mr. Livesey was, whether, presuming an exhauster was used, he ever had a back action? also, if the space between the bottom of the dip-pipe and the false bottom of the hydraulic was equivalent to the area of the dip-pipe, or whether he had to use more exhausting power to keep the same vacuum in the ascension-pipes?

Mr. Mead—Reigate—said he was afraid some of those who had spoken had not grasped the theory of Mr, Livesey's invention. With reference to the distance of the bottom of the dip-pipe from the bottom of the hydraulic, that must depend upon the size of the latter. If the dip was a 4-inch pipe he must have one inch from the bottom of the hydraulic to allow the whole of the gas to pass. The advantage of the proposed plan was that instead of allowing the tar to remain idle in the dip and the main by reducing the depth, he caused the whole of the tar to flow away. So far he thought this was an improvement.

Mr. Simpson—Rugby—asked whether Mr. Livesey had ever tried taking away the tar from the bottom of the hydraulic main. His experience was that by taking the thick tar as deposited from the bottom of the main the whole difficulty was removed.

Mr. Livesey said he had been pleased with the observations offered upon his paper, and would briefly reply to the suggestions which had been made. As to the question about the longer dip—had he lengthened the dip it would have reduced the available area of water for the seal. In old D-shaped hydraulics, it was simply half a circle, starting from the level of the bottom of the dip, and if he had brought the dip down to within two inches of the bottom, there would have been but a very small space of water to seal it, whereas by putting a false bottom at the level which he adopted, he retained the whole of the water-level for

the seal. As to the gas-way—he thought he had certainly left enough for any number of retorts. With reference to stopped ascension-pipes, Mr. Anderson was quite right in what he said, but he—Mr. Livesey—thought he could throw a little light upon the subject. Probably every one present remembered the instance of a large company who erected their works with one ascension-pipe only to their retorts, the result being a complete failure. He had himself tried a little experiment to determine the matter. He adopted one downward pipe from one end of the retorts, and had the ordinary ascension-pipe from the other. On some occasions he passed the gas one way, on others the reverse way, and he found in both cases that the pipes became in eighteen hours completely stopped up with hard stuff like iron. He came therefore to the conclusion that it was the heat of the gas which caused the carbonization of the tar, and converted it into this solid coke. When gas was taken from the two ends of through retorts, half the gas went up one ascension pipe, and half up the other, and each half of the gas travelled one quarter of the length of the retort, but if the gas was taken from one end, one-half travelled over three-quarters of the length of the retort, and the other half over a quarter only. In this way the heat imparted to the gas in passing over the whole of the hot coke caused so much heat in the ascension-pipe as to carbonize the whole of the tar. Supposing that in an old main there was a collection of this thick stuff which caused considerable resistance to the passage of the gas, if the other end was tolerably clear, the whole of the gas would pass in that direction, and in the course of a day that end would also be stopped up. But by taking care that the tar was always perfectly fluid, there was an equally free passage on each side. As to the question about making the hydraulic smaller, he thought he had already answered that, and he need only add that the object of making the bottom square and deeper was, that there should be more room for the thick stuff to accumulate, and no need to clean it out frequently. But if the accumulation could be prevented altogether, it was far better than having to remove it. His dips were 4-inch pipes, and the reason why he did not have them two inches below instead of one was, that he thought the bubbling of the gas through would keep the stuff in motion, and that if he had it nearly flat and only one inch below, there would be no tendency to slide down towards the centre, whereas with an incline and two inches, it would flow down. He started with his curve at a level with the dip-pipe. With respect to Mr. Simpson's inquiry, he might remark that he had not tried the experiment of taking the tar away from the bottom of the hydraulic. Some of his friends had done so, at times succeeding, and at others failing. The plan which he had adopted did succeed so far, and it was only a few days previously that he found on removing the cover from a main with a false bottom, that he could stir the stuff about with a stick like the ordinary tar about the place.

Statistics of the Iron Industry.

The ninth census gives the following information relative to the iron industry of the United States, for the year ending June, 1870:

Pig iron, 387 establishments, 574 blast furnaces (with a daily capacity of 8,357 tuns melted metal) employing 27,554 hands, producing 2,022,821 tuns of pig, of the value of $69,640,498.

Bloomary forges, 82, employing 2,902 hands, producing 110,808 tuns of blooms, of the value of $2,765,623.

Founderies, 2,653, employing 51,297 hands, and producing to the value of $99,837,218.

Forges, 103, employing 3,561 hands, and producing to the value of $8,147,669.

Establishments producing bar, rod, and railroad iron, nail, plate, etc., 309, employing 44,643 hands, and producing to the value of $120,301,158.—*Scientific American.*

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

Heating and Cooking by Gas.

Boston, Mass., Oct. 6, 1872.

Mr. Editor: I have read with much interest the article printed in your Journal of September 16th, on "Cooking by Gas," read before the British Association of Gas Managers, by Mr. Hartley of Westminster, including a sketch of the discussion which followed, upon the same subject, by the members of the Association. Much of Mr. Hartley's paper, as well as of the discussion to which it led, is taken up by a consideration of the various popular objections to the common use of gas for domestic purposes.

I am surprised, however, not to find any distinct and prominent mention of that, which certainly in this country, with the style of gas stoves in ordinary use with us, is the first and unquestionably the most fatal obstacle in the way of a general adoption of gas for heating and cooking purposes. I refer to the offensive and unwholesome odor arising from the products of combustion. Though at a loss to account for Mr. Hartley's silence on this point, I have no hesitation in expressing the conviction, that so long as there is any just ground for this objection, gas will never come into general use as a substitute for wood and coal.

In public restaurants, where the outer doors are continually opening, and in kitchens remote from the living rooms of houses, this objection is not much felt; but in private dwellings it is of course a very serious evil.

Venders of gas stoves talk very glibly about the perfect combustion of the gas, and are fond of assuring their customers, often, no doubt, fully believing what they say, that the air cannot be vitiated by burning gas if only the combustion is perfect. But this, it is hardly necessary to say to your readers, is a great mistake. Nothing can be annihilated. However perfectly the gas may be burned, there must always remain the products of combustion. Some portion of the oxygen of the air is required to support the combustion of the gas, and this entering into combination with the elements of the gas itself forms the products of combustion. The principal constituents of these products are vapor of water and carbonic acid gas. The character of the inferior constituents varies with that of the coal from which the gas is made, and also with the manner in which the gas is burned, whether with more or less air, or whether free, or in contact with some metal. Sometimes the most noxious vapors—the vapors of arsenic, for example—have have been detected in the products of combustion. Even luminous gas flames, from which it is not easy for gas to escape unburned, and the products of whose combustion for this reason are not perceptible to the smell, materially affect the character of the air, for they owe their very light to the oxygen they take from it, and, as we have said, substitute vapor of water and carbonic acid gas, and other elements in less quantity in place of it. With respect to heating burners, however (by which we mean burners constructed upon the Bunsen principle of mingling air with the gas before ignition, and which because their flames deposit no carbon, as the luminous jets do, are usually attached to gas stoves), it is a matter of great delicacy and difficulty to adjust them in such a way as wholly to prevent the escape of unburnt and offensive gas. And when they are properly adjusted, still the moment they are allowed to strike against a metallic substance, like the bottom of a kettle, owing either to the disturbance of the equilibrium of the flame, or to the effect produced by the contact of the gas with the metal, a pungent and disagreeable odor is emitted, and of so subtle a character that it is impossible to confine it in the room where the gas is burned, even when the doors are shut. To inhale these offensive products of combustion of gas in a close room produces distress of breathing and other dangerous symptoms.

These facts constitute an objection to the use of gas for domestic purpeses, which no theorizing can explain away. The public already very generally apprehend it; and so long as dealers persevere in crowding the market with gas stoves unprovided with pipes, such as ordinary coal stoves have, to pass off the products of combustion into the chimneys, the use of gas for heating and cooking in families will continue exceedingly limited.

We look forward, however, to a change. We have faith to believe that, under the pointings of leading scientific minds, the gas companies of this country will soon see it to be for their interest to consider the measures necessary to be taken to secure a general use of gas as fuel; and with this object in view, we cannot doubt that their first step will be to recommend the general adoption and use of gas stoves, constructed like the various patterns of the so-called "Cambridge Gas Heaters," with appliances for conveying the products of combustion to the chimney, or where there is no chimney, by pipes to the outer air.

Citizen.

Dry Meters and Clogged Service Pipes.

Carlinville, Ill., Sept. 20, 1872,

Mr. Editor: Will you be kind enough to answer the following inquiries, if in your power to do so:

Does naphtha or petroleum oil gas destroy diaphragms of dry meters?

If so, is there a remedy to prevent incrustation or hardening of leathers?

We are troubled with meters passing gas without registering. The diaphragms are sound, but a stiff, gummy substance is found on tbe sides of meters, valves, etc. Our gas is free from condensation, or very nearly so, but we find many of our service pipes become stopped up tight with a black, watery substance, always *next the main*, and gradually diminishing in quantity towards the meter, *entirely* disappearing, say five to twenty feet distant from street main.

Can you tell the cause of, and remedy for this accumulation of matter?

Very truly yours,
C. W. Weer.

[We trust we may not be disappointed in leaving the above important inquiries for reply from some of the practical men among the constituents of the Journal. We must suggest, however, that probably further and explicit information should be given on important points involved, to facilitate such replies; as, for example, whose make the meters are, and what the gas is made of and how, with some other particulars at present left unexplained.—Ed.]

Poisoned Colors.

Lower Sydenham, S. E., Sept. 6, 1878.

Mr. Editor: I was pleased to see the paragraph in your Journal on "Poisoned Colors." It is a subject not sufficiently ventilated by journalists, but most important to the general public, who like to know the poisoned playthings they give to children. I was struck with the words "equally injurious are the phenol colors prepared from phenol or carbolic acid." Can it be that carbolic acid soap now so *largely* used, not only for household purposes but for the toilet, can be poisonous—if so, the sooner it is generally known the better. Perhaps the publishing of this letter may bring a reply.

Yours faithfully,
Magnus Ohren.

Strike of Coal Miners in Illinois.—The strike of the coal miners of St. Clair county, Illinois, which was supposed to have ended some days ago, took a fresh start to-day (August 26). At a meeting of the miners near Belleville, to-day, it was decided by the sixteen Unions represented to hold out for four cents a bushel, the price demanded at the outset. This decision will seriously affect manufacturers and private consumers here, as St. Louis obtains much the largest amount she uses from the mines of St. Clair county.—*St. Louis paper.*

THE AMERICAN

GAS-LIGHT JOURNAL

AND

Chemical Repertory,

PUBLISHED ON THE 2D AND 16TH OF EACH MONTH,

At No. 42 Pine Street, New York.

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PROPRIETORS.

EDITOR---PROF. HENRY WURTZ.
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☞ All communications to be addressed to "THE EDITOR, No. 42 Pine Street, Room 18, New York.

WEDNESDAY, OCTOBER 16, 1872.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 11 and 121 Nassau street, New York agents for this Journal. News dealers will please send orders to them.

NOTICE.

☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to fifteen cents, and the registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

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THE USE OF RED LIGHT in photography has been found to hasten impressions and increase their sharpness. A diaphragm of thin translucent reddened paper in place of the ordinary metallic diaphragm in the camera has been tried with great success.

NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

This body held a semi-annual meeting at Newport, August 24. Representatives of a majority of the gas companies of New England were present, together with Messrs. J. R. Thomas, W. R. Thomas, T. F. Rowland, and Dr. Smith, of Brooklyn, N. Y., and Prof. Stimpson, of Kansas University, as visitors.

Vice President George Dwight, of Springfield, Mass. (the President being absent in Europe), occupied the chair.

The morning hour of the session was devoted to the consideration of the report of the committee upon the subject of the "sizes of pipes and supplies."

After discussing the report, Professor T. E. Simpson, Kansas University, presented and read a paper on the spbject of "Gas Burners," which received the thanks of the Association, and was ordered to be printed for the use of the profession.

In the afternoon, the Association, by invitation of Mr. T. F. Rowland, made an excursion down the bay on Mr. Aspinwall's splendid steam yacht, Day Dream, past Narragansett Pier, and as far out as Point Judith, which they examined carefully with good marine glasses. On returning to Newport, carriages were provided, and a drive occupied the rest of the day.

A meeting was held in the evening, when matters of general interest to gas engineers were discussed, and an adjournment made to the annual meeting in February.

Why cannot this Association, which at present appears to follow a somewhat *exclusive* policy—in somuch that we do not find it easy to get information of its meetings or proceedings—be made, or make itself, a nucleus for the crystallization of a national or continental Association of Gas Experts, such as we have so often urged? The desirableness, nay, the necessity of such an Association, and of the interchange of views and information to which it would lead, with the benefits that would arise from it both present and prospective, are sufficiently manifest. When will the dry bones stir?

PLANT-LIFE AND SILICA.

An item copied from Prof. Joy in another column, entitled "Decomposing Action of Humus on Minerals," refers to some theoretical views of the Editor of this Journal, promulgated before the New York Lyceum of Natural History about two years since, and published in abstract, in this Journal for November 2d, 1870.

Though feeling greatly indebted to Prof. Joy for the complimentary and appreciative way in which he has treated these views, which, on the part of other scientists and scientific journals, was met with a total neglect that is rather discouraging, still the Editor feels impelled to say that the points in his theory alluded to by Prof. Joy are not those to which he himself attached, and attaches, the most importance, or for which he claims the greatest degree of novelty. The functions performed by organic acids in some of the metamorphic and general chemo-genetic changes of the present epoch, have to a considerable extent been recognized and defined by the illustrious Bischof, and, following him, further developed more especially by our great American chemist Sterry Hunt. I claim first—to have been the first to follow back inductively this generalization to the initial conditions in the past that it involves; and being led in the course of this investigation to consider the relations of silica, in its free and uncombined forms, to vegetable life, I claim secondly to have first recognized the fact that we know of no other universally acting cause or source of elimination of free silica than vegetable life; and have thus been conducted to the entirely original proposition that all silica was primarily, that is, at the dawn of life upon the earth, in combination, as silicates; and that all free silica, including quartz, has been due directly or indirectly to zoic influences. This forms one of the postulates of my "Zoic Theory of Chemical Geogony," part of which was developed to the American Association at the Salem meeting of 1869.

Among the continually augmenting and accumulating products of life, and of life only, in and on the earths crust, according to this comprehensive theory, are, besides *free silica*, *hydrocarbons*, free *oxygen*, *ferrous oxide*, *ferrous* and other *sulphides*, *calcic*, *magnesic*, and *ferrous carbonates*; and there is continually consumed, in the production *of all these*, the carbonic acid of the atmosphere, which is now so far reduced as to point, with the finger of fate, to the far but sure epoch when life on the earth must end; to the final zoic catastrophe, which the present writer was the first to demonstrate, and which will be followed in all probability, sooner or later, by a kindling or combustion beetween the accumulated oxygen and the hydrocarbons, sulphides and ferrous compounds, and a melting together "with fervent heat" thus developed, of the silica and the carbonates, a restoration of the carbonic acid, with deoxygenation of the air, and a general restoration of the initial conditions, the *Status quo ante Vitam*.

THE BRITISH COAL FAMINE.

"Whistling to keep their courage up" is the cue of British journalists, with regard to the terrible writing on the wall, that now stares them in the face. The *Journal of Gas Lighting*, Sept. 24, says, for example:

"Difficult as it is to form an opinion as to the future of the coal trade, there would appear to be indications that the price of our staple has now reached its maximum, and a decline, more or less rapid, may be anticipated, though probably never a return to former rates."

Per contra, we have since, under the telegraphic head—"Another Advance in Prices."

"LONDON, OCTOBER 8.—The price of coal has again advanced. The mining companies of Belgium are not able to execute the orders they have received to send coal to this country, in consequence of the scarcity of miners in that country."

In this connection it is not to be forgotten that the cost of French coal has been rising of late steadily, though not so rapidly, as in England. The subject, however, has attracted some attention in France, where diligent search is being also made for new coal-fields, so as to counteract by larger supplies the tendency of prices to rise. Some of the Councils General have voted money for engineering explorations to ascertain if these new resources can be obtained. If these are successful, it is possible the new export trade may be continued.

Are *we* going to be affected by these things? To the present writer an affirmative answer appears inevitable. One straw, showing the way the wind blows, is the fact, which we learn from the *Coal Trade Circular*, that all the foreign, seagoing steamers are now using our American bituminous coals, and if the rate abroad should be increased, as it has been lately, they may take sufficient to last them on their return voyage, particularly if freights outward from here remain

so quiet as at present; even after the fall crops commence to be moved, it will be a question as to whether the rates of freight they are able to obtain, will equal the rise in the value of coal in England.

This subject is far from being a speculative one, and could we give the time and space, it would not be hard to prove the certainty of great and speedy changes in the most momentous affairs of the world.

THE LONDON GAS REFEREES.

A new Board of Referees has been appointed by the Board of Trade for London. It consists of Professor Tyndall, Vernon Harcourt and Wm. Pole, the latter having been connected with the previous Board, which has fallen into disfavor, as we think, altogether undeservedly. Mr. Harcourt is known as a chemist and of late as the proposer of a rather dubious (as yet) method of desulphurizing gas. Of Professor Tyndall everybody knows something, and we in America are likely to know more, as he is here with us now. All three of these gentlemen attach F. R. S. to their names. Their salaries are to be £200 per year with office expenses. This amount of compensation is not encouraging. They have already, as their first action, raised the maximum of sulphur allowable per 100 feet to 20 grains, instead of 15, as settled by the last Board.

To our great regret space fails us yet, and probably will altogether, even for the briefest digest of the last (Supplementary) Report of the former Board on Sulphur. The gist of it was, as appeared to us, that they established their claim to priority, in spite of the opposition of eminent gas engineers, to the first really practical appreciation and use of *sulphide of calcium* to extract bisulphide of carbon. The evidence of any previous use of this method, *with understanding and purpose*, was indeed quite vague and shadowy.

GAS STOVES.

In this issue appears a very intelligent communication on the subject of gas stoves, which we wish we could comment on at length, but find we must defer that pleasure. The main point made, to which we will give a few words, is that, contrary to the opinions of Mr. Ohren, and of other eminent experts who joined in the discussion in the British Association of Gas Managers, there must, as a general thing be, chimneys, to avoid bad odors and contamination of the atmosphere. There is very much to be said here, and our correspondent's remarks have indubitably a certain amount of force; but just how much, and under what circumstances according to our own notions, we must needs defer to set forth, until a more convenient season.

What we would here say is that this is a matter which will regulate itself, and it does not, as we think, in any way affect the force of the remarks we have thrown out about the greater convenience and portability of gas stoves, and particularly their greater cleanliness. It is obvious also that the application is more to heating than to cooking stoves. Moreover there are a multitude of cases in which heating stoves are needed but transiently, for a period far too short to contaminate the air to any injurious extent.

GOVI'S SENSITIVE FLAME.

[The controversy regarding the priority of discovery of this new sensitive gas flame, in which the gas burns above a diaphragm of wire gauze, and whose first discovery was claimed in a letter received by us from Mr. Barry of Cork, Ireland (see this Journal for May 2, 1872, page 110) is at last settled. Mr. Barry, very creditably, at once abandons his claim on becoming aware of the facts. His letter, as below, explains itself. We shall endeavor to obtain Professor Govi's memoir, referred to by him, and translate it for our readers.—ED.]

CIVIL ENGINEERING AND GENERAL SURVEY
OFFICE, 65 SOUTH MALL, CORK,
September 24th, 1872.

Dear Sir: Referring to an article in your Journal of 3rd June. 1872, upon a new form of sensitive flame discovered by me last year, I enclose you a copy of a letter received from Prof. Govi of Turin, on the subject. In this you will see that he has, independently of my experiments, observed the same curious form of flame, and as it appears, a notice of his observations was published in the *Moniteur Scientifique*," previous to the appearance of mine in *Nature*. It is due to Prof. Govi to say that the entire merit of priority rests with him. With thanks for the interest you have taken in the matter.

I am, very faithfully yours,
PHILIP BARRY.

Prof. HENRY WURTZ, New York.

[For the convenience of some, it may be well for us to translate Prof. Govi's letter which is written in French.—ED.]

TURIN, August 25, 1872.

Mr. Barry: I was absent from Turin when your letter arrived, whence my tardy response. The experiments that you have made upon sensitive flames are altogether identical with mine, and I am happy to see that you have thus confirmed them.

I mail to your address a copy of a memoir, in which I have described my investigations. You will there see a process for rendering visible cold jets of gas, and the consequences I have been able to draw from its application; things which appear to throw an altogether unexpected light upon the theory of long sensitive flames proposed by Messrs. Tyndall and Barrett.

I am pleased, Sir, with the attention you have been kind enough to bestow upon my work, and pray you on all occasions to dispose of

Your wholly devoted.
GILBERT GOVI.

ANOTHER IMMENSE BRIDGE.—It is proposed to throw a great bridge over the Hudson river at Poughkeepsie. The bridge will be composed of 5 spans of five hundred ft. each, and it will be one hundred and twenty feet in height. It will connect New England with the coal-fields of Pennsylvania.

GEO. A. McILHENNY'S
PATENT
VACUUM PROCESS,
FOR RELIEVING GAS RETORTS FROM PRESSURE.

This process was patented by Mr. McIlhenny in the United States and Great Britain, in June 1867, and was the first patent for this purpose ever obtained in the United States (but was not presented to the public until its merits were fully tested). It has now been in successful operation for nearly six years, with the most satisfactory results.

The many devices lately brought to the notice of the American public, purporting to accomplish the same results that are claimed for the McIlhenny "Vacuum Process," are mostly old English contrivances that were tried and abandoned years ago, on account of the many difficulties of keeping in working condition the amount of machinery, such as stuffing boxes, valves, levers, etc., necessary to operate them.

But the extraordinary results obtained by the McIlhenny process, have induced some unprincipled persons to bring to the notice of the public, as *recent inventions of their own*, some of these old devices, although none of them pretend to claim that they can in any manner compete with the "McIlhenny Process." But their purpose seems to be simply to evade the McIlhenny patent.

The McIlhenny "Vacuum Process" for relieving Retorts from pressure in the manufacture of Illuminating Gas, is not only safe, simple and effective, but it costs but little to apply it either to old or new works. The only machinery necessary to operate it is a one and a half inch stop cock, and a half inch stop cock to each bench of Retorts. No alteration in the old system is required. In fact, a Works operated with this process, can at any time be operated on the old pressure system, simply by closing the two stop cocks above mentioned. There is nothing about it that can get out of order, nothing that requires special attention; no stuffing-boxes to pack and keep tight, no valves to keep clear of tar and pitch, no levers to lubricate, and no expense for a great amount of machinery.

Those operating their Works with the McIlhenny process, challenge the world to compete with them, as regards the yield and the quality of the gas.

For further particulars apply either to GEO. A. McILHENNY, Engineer of the Washington Gas-Light Co., Washington, D. C., or to WILLIAM YORKE, Engineer of the Portland Gas-Light Co., Portland, Me., who will take pleasure in corresponding with any one feeling interested in the matter or in showing the operation of the process at their Works.

307-1y

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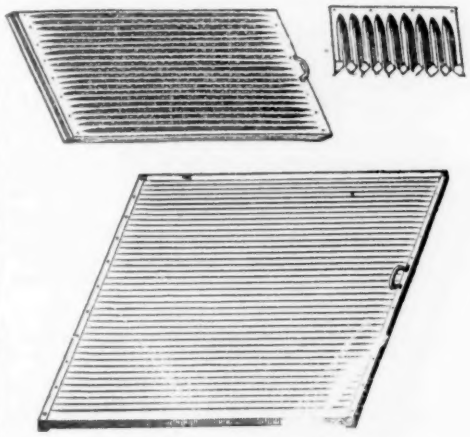

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☞ In looking for advertisements, see figures 1 to 12, within brackets, at head of advertisement pages.

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Gas-Burners—C. Gefrorer, 259 Commerce st., Philadelphia, Pa 6
Gas Purification—St. John and Cartwright 6
Gas Meter Manufacturers—Harris & Bro., 1117 Cherry st., Philadelphia, Pa 6
Gasometers, Etc.—Geo. Stacey & Co., Cincinnati, O 3
Gas Fixtures, Etc.—Mitchell, Vance & Co., 597 Broadway .. 4
Gasholders, Etc.—Deily & Fowler, 39 Laurel st., Philadel .. 4
Gas and Water Pipes—B. S. Benson & Son, Allentown, Pa .. 5
Gasometers, &c.—Keystone Iron Works—2132 Filbert st., Philadelphia 4
Gas Screens—American Gas Screen Manufacturing Co., Haverhill, Mass 1
Jersey City Gas Meter Works, 14 Morris st., Jersey, N. J 3
Northwestern Gas and Water Pipe Co.—646 Wabash Ave., Chicago, Ill 7
Patent Conically Slotted Wood Trays—John L. Cheesman, 147 and 149 Avenue C., N. Y. 5
Patent Gas Exhauster—Smith & Sayre, 95 Liberty stireet .. 9
The Gas Light Co. of America—Box 5220, New York city ... 4

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Pascal Iron Works—Morris, Taskar & Co., Philadelphia 19
Providence Steam and Gas Pipe Co., Providence, R. I.—H. A. Branch, Agent 4

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Water Pipes, etc.—S. Fulton & Co., 412 Walnut st., Phila ... 6

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Laclede Fire Brick Works, 107 North Levee, St. Louis, Mo.. 8
Manhattan Clay Retort Works, 15th st., near Av. C, N. Y.. 8
Philadelphia Fire Brick Works, Vine and 23d sts., Phila 8
Retorts, Etc.—Geo. C. Hicks & Co., Baltimore Md 6

LAMPS, STOVES, PETROLEUM, ETC.

Patent Lamp Post—J. W. Graham, Chillicothe, Ohio, or A. M. Callender, office of this Journal 9

MISCELLANEOUS.

Architect and General Gas Engineer—William Farmer, 111 Broadway Room 91 3
A Synopsis of British Gas Lighting—Jas. R. Smedberg, San Francisco, Cal 4
American Journal of Science and Arts—Silliman and Dana, New Haven Conn 7
Contractors for Gas Works, Etc.—Murray & Baker, Fort Wayne, Ind 5
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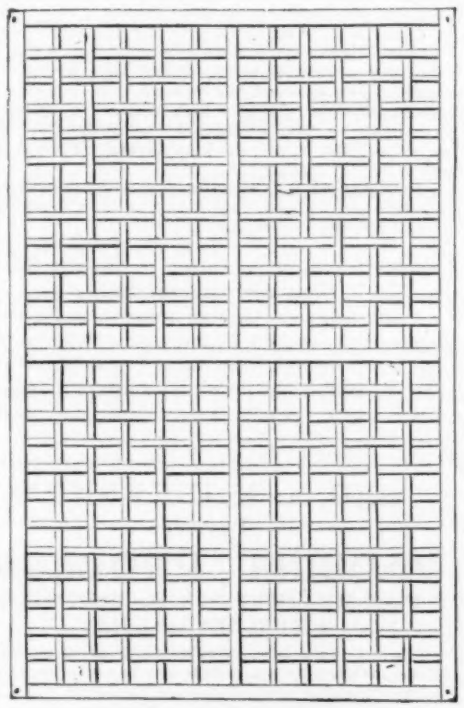
AMERICAN

GAS SCREEN MAN'F'G COMPANY.



TO GAS-LIGHT COMPANIES.

Your attention is respectfully called to the GAS SCREEN now being manufactured by the American Gas Screen Manufacturing Company, under the patents granted to E. DUFFEE, and are pleased to submit the following points of their excellence and superiority over all other screens now in use.

The Screen is made with an oak frame, interlaced with split rattan, drawn through holes at regular intervals in the Frame and cross-pieces, the edges of the frame being grooved to prevent abrasion.

The advantages of the screen are:

1st. The large purifying surface, the construction of the Screen giving over three-fourths of the surface for the gas to penetrate the lime.

2d. On account of the free passage of the gas through the Screen the pressure is reduced, thereby preventing the accumulating of carbon on the retorts.

3d. The saving of lime and labor, as the Screens are not liable to clog, and are easily cleaned.

4te. Their cheapness and simplicity of construction.

5th. Their DURABILITY—they can be used longer than any other now used.

Testimonials.

PROVIDENCE, RHODE ISLAND, March 21st, 1872

LUTHER DAY, Esq., Agent, etc.

Dear Sir: The Trays manufactured by you for our West Station were put in use in September last, and have *given perfect satisfaction.*

The frames are well put together, and I see no reason why they will not last for a long time. The *very large amount of open space* in these Trays gives the gas an easy passage, and brings it into contact with the lime much better than when the space is so contracted, as is the case in most of the other Trays in use.

The pressure thrown upon the retorts by contracted passages is very great, and were gauges used more frequently than they now are in many gas-works, this fact of having *open Trays* would become more apparent to managers of gas works. The difference in pressure at this station in passing the gas through your purifiers, is two-tenths (2-10) inches.

The amount of gas purified, per bushel of lime used to this date, is six thousand five hundred and fifty six (6,556) cubic feet.

Respectfully yours,
JAMES H. ARMINGTON, Supt.

BOSTON GAS-LIGHT CO., Dec. 1871.

Dear Sir: In answer to your inquiry how we like your Patent Tray for dry gas purifiers, I take pleasure in saying we have used them exclusive of all others, for the last three years, and think them far ahead of any yet offered. The surface being nearly three times that of any other Tray, and their lightness and durability perfectly satisfactory.

Yours respectfully,
A. M. GILES.

EDWARD DUFFEE, Esq.

EAST BOSTON, JUNE 15, 1871.

Gentlemen: We have used your Screens some five years. They give perfect satisfaction.

I consider them *by far the best Screen* for Dry Lime Purifiers I have seen. Yours truly, A. M. NORTON, Supt.

CHELSEA, May 1, 1871.

Mr. E. DUFFEE.

We are using your Purifying Trays, and find them to be the *best of any* that I have used, and will *purify more gas with less pressure* than any tray that I know. I can fully recommend them, after four years trial, to any Gas Superintendent with perfect safety, as the *cheapest and best Tray made.*

Yours truly, JOHN ANDREW, Sup't.

DORCHESTER, March 3. 1870.

Mr. E. DUFFEE.

Dear Sir: We have had your Gas Trays in constant use for almost one year and six months, and find them superior to any others we have ever used, both in point of economy and efficiency. Truly yours, W. B. BROOKS,
Agent Dorchester Gas-Light Co.

JAMAICA PLAINS, MASS., June 21, 1871.

EDWARD DUFFEE, ESQ.

Dear Sir; The Trays ordered by this company three years ago, are getting somewhat worn. I wish to say here that I consider your Trays to be superior to any yet invented, therefore please make us another set at the price named, to be like the sample shown in every way, and oblige Yours truly
JAMES F. ROGERS,
Sup't Jamaica Plains Gas-Light Co.

BROOKLINE, June 11, 1871.

E. DUFFEE, ESQ.

Dear Sir: You will please make a set of Gas Trays for this company as soon as convenient, at price named. In regard to the merits of the Tray, after having them in constant use for over two years, I will say that I consider them *superior to any Tray* manufactured in this country. Respectfully yours,
H. A. ALLYN,
Sup't Brookline Gas-Light Co.

BANGOR, August 2, 1870.

EDWARD DUFFEE, ESQ.

Dear Sir: Yours of the 20th ult. is received. In regard to your Gas Trays, I take pleasure in saying that they have been in use over two years, and have given perfect satisfaction and they are in good order at the present time; should have no hesitation in recommending them, believing they are the most durable and easiest kept in order of any with which I am acquainted. Respectfully yours,
W. H. PERRY, Sup't.

OFFICE OF THE SPRINGFIELD GAS-LIGHT CO.,
SPRINGFIELD, MASS., Oct. 10, 1871.

Mr. WARD,
President Hartford Gas-Light Co.

Dear Sir: I have been using Gas Screens made by the American Gas Screen Company, for nearly a year, and find them superior in every way to the wooden Screens made and formerly used by the Springfield Gas-Light Co. I can purify more gas with the same quantity of lime, there being more surface to the Screens; and I consider them more durable, and recommend them to your consideration.

Yours with great respect,
GEORGE DWIGHT.

ROXBURY, June 14, 1872.

EDW. DUFFEE, ESQ.

Dear Sir: In answer to your inquiry regarding your Patent Gas Screens, I am happy to be able to say, that after nearly three years constant use we are perfectly satisfied with them being able to purify over fifty pet cent. more gas with them, than with any other Screen we have used.

Yours respectfully,
THOMAS J. PISHON.

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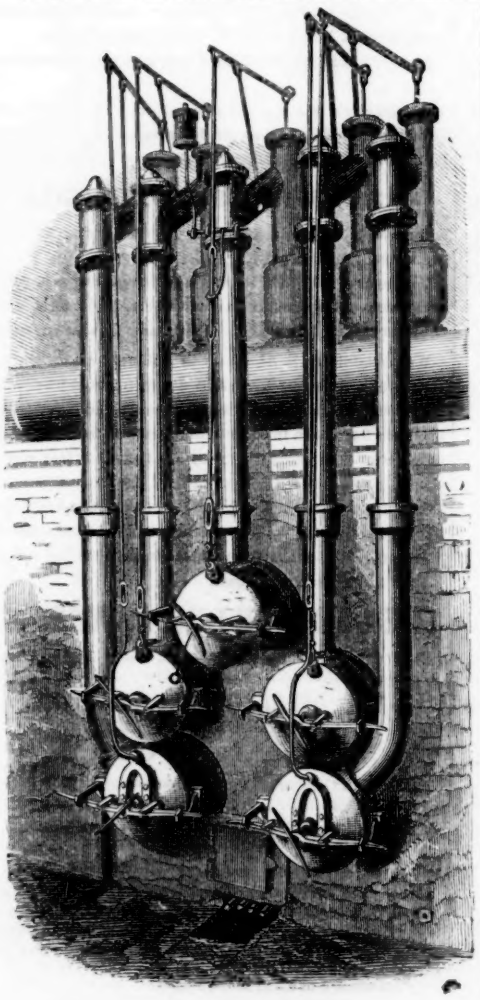

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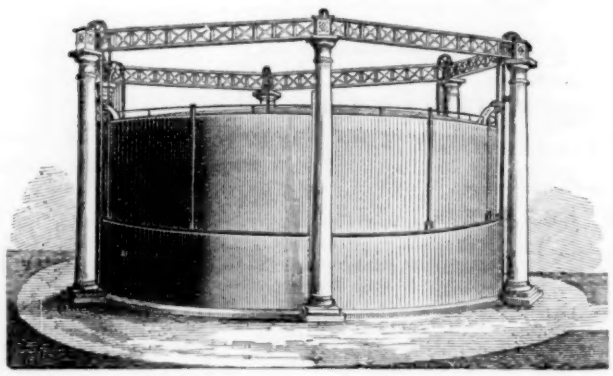

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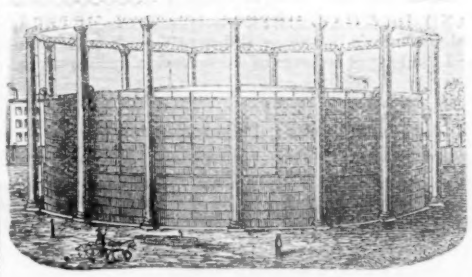

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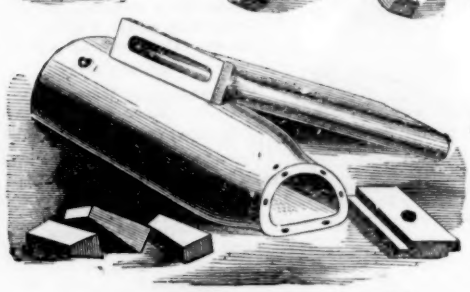

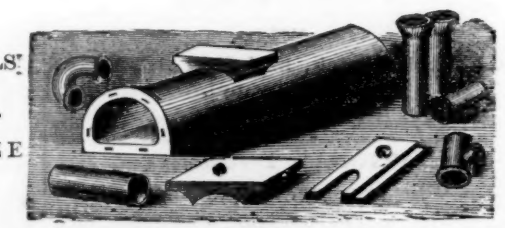

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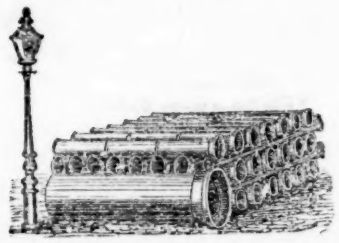

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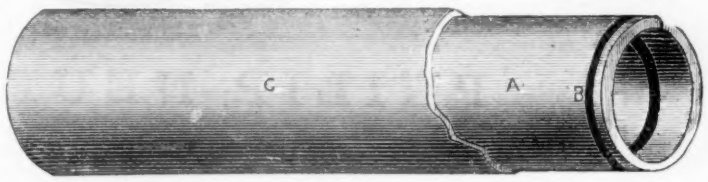

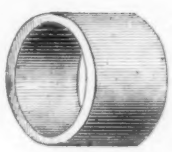

FIG. 2.

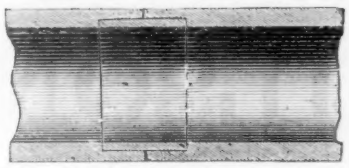

FIG. 3.

A—Cylinder of Wood. **B**—Band of Iron. **C**—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3.—Horizontal Section and Connection.

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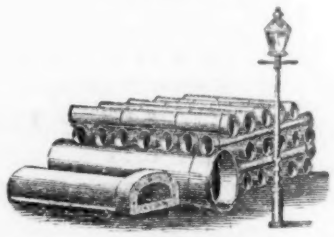

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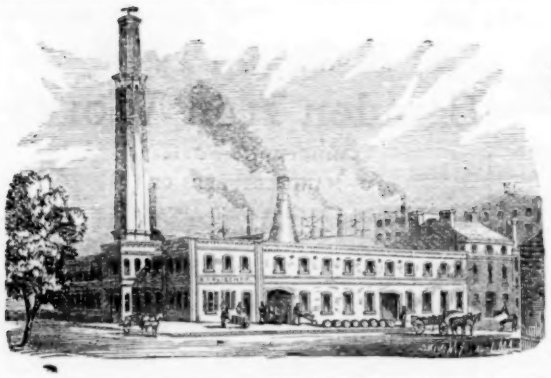

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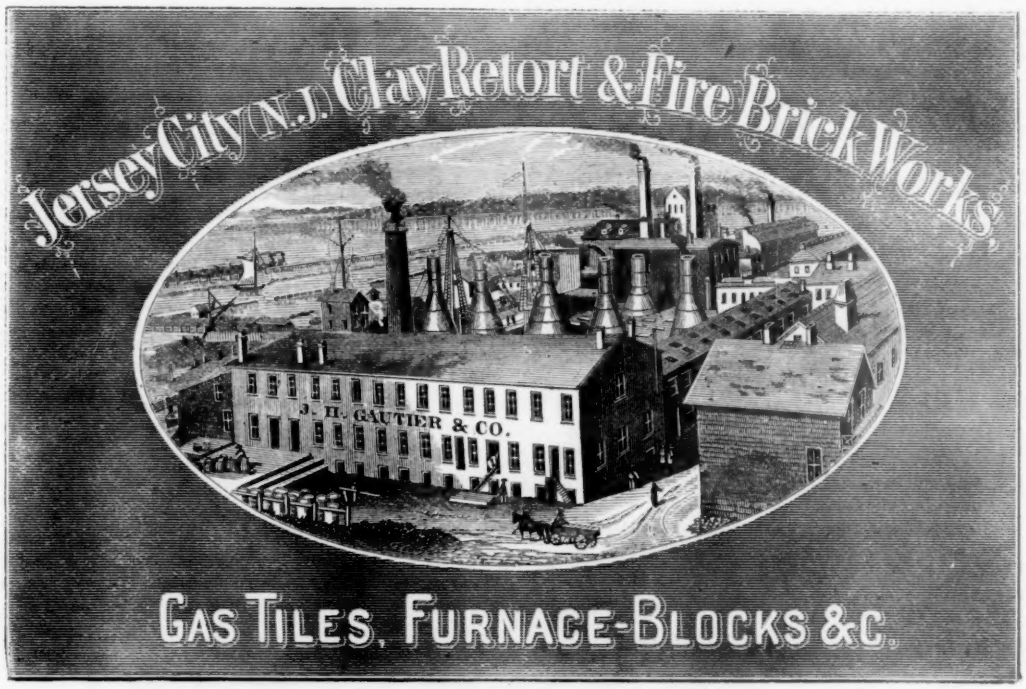

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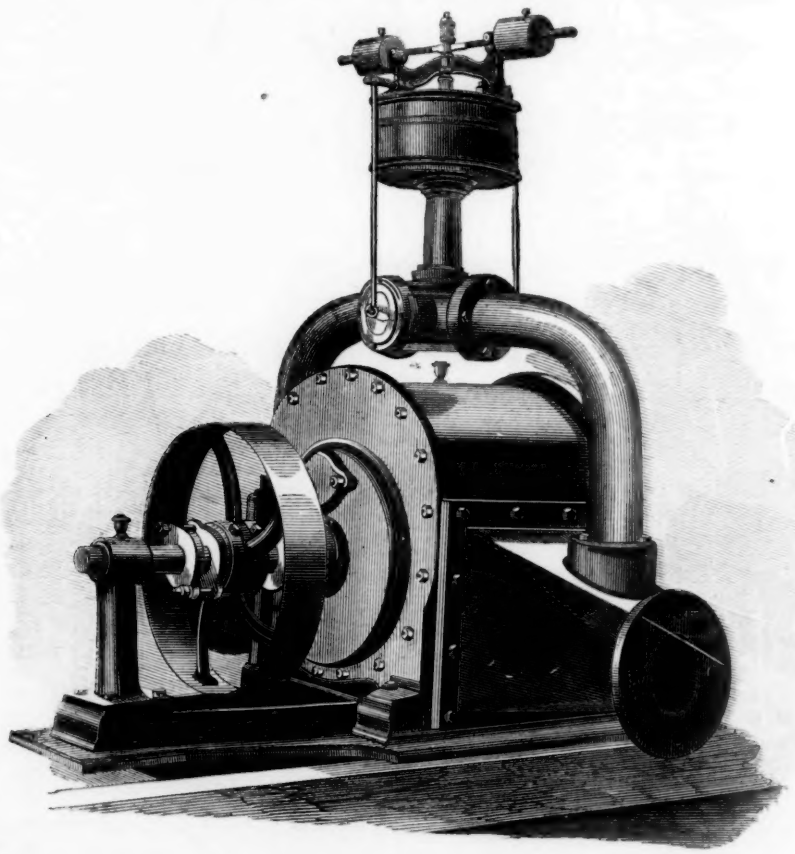

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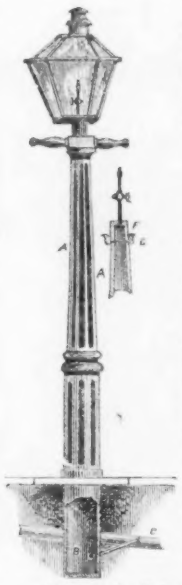

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PASCAL IRON WORKS,

Corner Fifth and Tasker Streets, Philadelphia, and No. 15 Gold Street, New York.

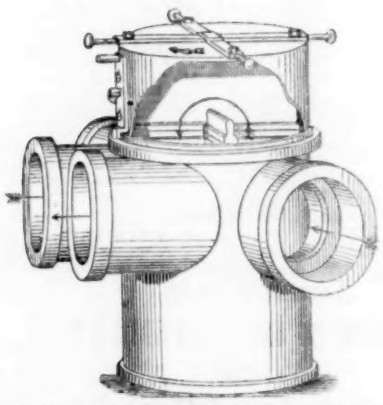
Established 1821,

THOMAS T. TASKER, Jr., STEPHEN P. M. TASKER.

FOR GAS WORKS MACHINERY, ADDRESS CORNER FIFTH AND TASKER STREETS, PHILADELPHIA.

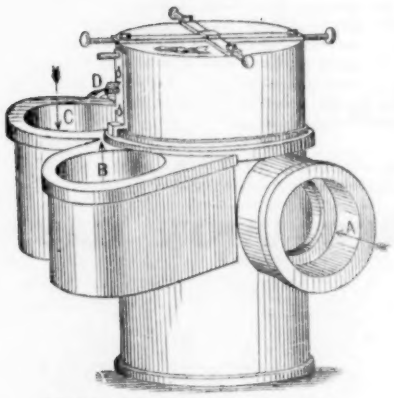
Manufacturers and Builders of Gas Works, &c., of all Descriptions, of the Most Approved Plans.

No. 1.



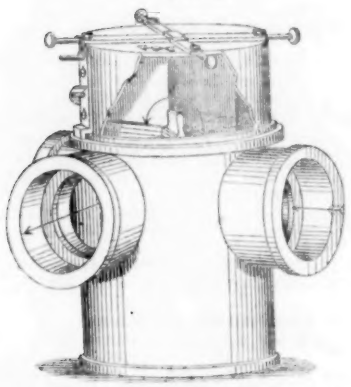
By Pass with Drip for Single Apparatus.

No. 3.



Meter By Pass with Drip.

No. 5.



Single By Pass with Drip.

Messrs. Morris, Tasker & Co., respectfully ask the attention of Gas Engineers and others, interested in the erection of Gas Works and the manufacture of Gas for illuminating purposes, to their new and improved By-Passes, which are made from entirely new and original designs.

They are constructed with water seal compartments to pass the gas through the required channels without leakage; with drip chambers to catch the water of condensation, tar, and ammoniacal liquor; and also with a loose or circular valve, to control the direction of the gas flow.

The By-Passes shown in the annexed illustrations, are similar in construction and varied in size to suit works of different capacity

No. 1 is a By-Pass for Gas Works of small generating power, and using but a single apparatus; the gas from the retorts enters the proper nozzle, as shown by the arrow, and being deflected by the diaphragm of the valve over one of the vertical partitions of the drip chambers, it passes through one of the nozzles to the meter and returns to be again deflected by the rotary valve to the gas holder.

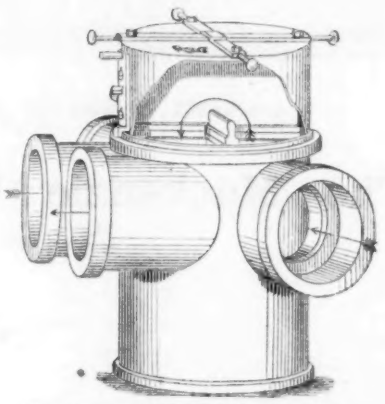
No. 2 is a By-Pass for using two apparatus, the gas is entered and the direction of its current is controlled similarly to that of No. 1, just described.

No. 3 is a By-Pass for passing the gas around the meter or not, according to the set of the loose or circular valve.

No. 4 is a sectional view of No. 3, and fully illustrates the construction and arrangement of the various By-Passes; the vertical partitions P are placed at right angles and divide the By-Pass into four drip chambers, they extend to within a short distance of the bottom to allow the water W, which forms the water seal, to circulate freely; the valve V is constructed with a diaphragm which divides it diametrically, the edges from ground joints with the upper edges of the partitions P, to prevent the gas from leaking from one chamber to another, and also to protect the ground surfaces from the corrosive action of the gas.

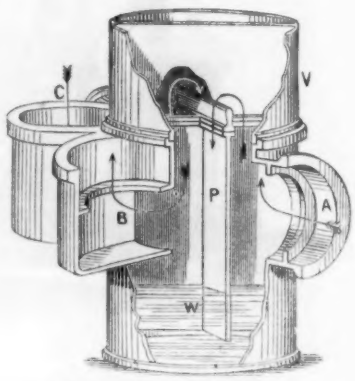
No. 5 is a single By-Pass with Drip Chambers.

No. 2.



By Pass with Drips for two Apparatus.

No. 4.



Section of No. 3.